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<i>DB=USPT,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>			
L11	l9 and L10	29	L11
L10	(feed or supplement)	1142115	L10
L9	L6 not l8	78	L9
L8	L7 and l6	5	L8
L7	probiotic	771	L7
L6	l2 same l3 same l4	83	L6
L5	l2 and l3 and l4	2000	L5
L4	yeast	77082	L4
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File: JPAB

Oct 19, 1993

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TITLE: PRODUCTION OF FEED FOR BREEDING FISH AND FEED FOR BREEDING FISH

PUBN-DATE: October 19, 1993

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ABSTRACT:

PURPOSE: To obtain the subject inexpensive bait assured in supply, free from growth inhibitory factors, thus not inhibiting fish growth by fermenting soybean cake with microorganisms to decompose and eliminate the oligosaccharides therein.

CONSTITUTION: Soybean cake is inoculated with microorganisms such as fungi belonging to Aspergillus, yeast belonging to Saccharomyces, or bacteria belonging to Lactobacillus to carry out fermentation to decompose and eliminate the oligosaccharides in the soybean cake, thus obtaining the objective bait. Specifically, in the case of using yeast, it is recommended that the water content of the soybean cake be regulated to 35-50wt.% and the yeast added at ≥10wt.% based on the soybean cake. In the case of using bacteria, the water content of the soybean cake is recommended to set at ≥40wt.%.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the method of manufacturing the feed for farmed fishes, the method of manufacturing the feed for farmed fishes by using soybean cake (defatted soybean) as a raw material especially, and the feed for farmed fishes prepared considering soybean cake as a subject.

[0002]

[Description of the Prior Art] The aquaculture of our country carried out development expansion by leaps and bounds in the past about ten years. Increase of Japanese people's taste to high-class fish, such as a yellowtail and a flounder, had supported it, and, in addition to this, it was the historical Ootoy fishery of the sardine as a feed for farmed fishes. However, **** begins to be visible to the bumper fish crop of a sardine over the past several years, and the poor catch of a sardine also began to be predicted in the future. Now, since ***** of the food of farmed fishes is the dryness fish meal which made a raw sardine and it the raw material, when it becomes the situation of the poor catch of a sardine, it will become destitute in reservation of the food of a farmed fish instantly.

[0003] Here, although it is cheap and the soybean cake which can be supplied adequately is used as feed of livestock, if soybean cake is given to farmed fishes, such as a yellowtail, generally it is known that growth of a fish will be checked on the contrary. That is, although oligosaccharide, such as a sucrose, a raffinose, and a stachyose, is contained about 10% in soybean cake, it is clarified now that this checks growth of farmed fishes, such as a yellowtail. About this point, the fish has the diabetes-body potentially, for example, and a saccharometabolism function is low. This sake, If high carbohydrate feed is given to a fish, the absorbed carbohydrate cannot be used effectively. The degree of growth falls and the report that the fish stock of carnivorous is strong is made like the yellowtail in the inclination (U.S. Yasuo : Vol. chemistry, an organism, 22, No.8,489 -491 (1983) reference). for this reason, soybean cake -- as the feed for farmed fishes -- as an extending agent -- a fish meal -- **** -- few quantities are blended and it is used -- it is not alike too much

[0004] However, as described above, the poor catch of a sardine is predicted in the near future, and although the need of finding out the alternative feed immediately now [when shortage of the feed for farmed fishes and high cost-ization are expected] is increasing, if oligosaccharide is removable from soybean cake, it can be used as a feed of a farmed fish. In this case, as a method of removing oligosaccharide out of soybean cake, the method only had conventionally that alcohol washed soybean cake.

[0005]

[Problem(s) to be Solved by the Invention] By the method of carrying out alcoholic washing of the soybean cake, and removing oligosaccharide, cost starts the processing too much. That is, if alcoholic washing of the soybean cake tends to be carried out and it is going to obtain a feed, 5 to 6 times as many processing costs as the price of the soybean cake of an amount which it is going to process will start. Therefore, it sees actually and the method of carrying out alcoholic washing of the soybean cake cannot be adopted as an art of soybean cake, and conventionally, there is no method of obtaining the feed for farmed fishes by using soybean cake as a raw material, and it was *(ed) with the path of use of the soybean cake as a feed for farmed fishes replaced with a raw sardine or its fish meal.

[0006] This invention aims at offering the feed for farmed fishes which consists of soybean cake by which growth inhibition is not carried out, when the method of manufacturing the feed for farmed fishes which is made in view of the above situations and does not contain a growth inhibition factor by using soybean cake as a raw material, and a fish bait.

[0007]

[Means for Solving the Problem] In this invention, soybean cake is used as a raw material, a microorganism is inoculated into the soybean cake, fermentation processing of the soybean cake is carried out, and zymosis decomposes and removed the oligosaccharide in soybean cake. Still more specifically, as a microorganism, it is independent, or it is bacterias, such as yeast fungi, such as mold, such as an Aspergillus (Aspergillus) group and a rhizopus (Rhizopus) group, and the Saccharomyces (Saccaromyces) group, or a bacillus (Bacillus) group, the Lactobacillus (Lactobacillus) group, etc., and two or more kinds of things used for a brewing or manufacture of a fermented food are used, combining them. And when using mold, such as an aspergillus, the soybean cake with which the mold is inoculated is adjusted to a part for the low water flow of 35% or less of moisture contents, and it is made to perform fermentation processing. Moreover, when using beer yeast, wine yeast, sake yeast, baker's yeast, etc., the soybean cake with which the yeast fungi are inoculated is adjusted to 35 - 50% of moisture contents, and it is made to perform fermentation processing. In this case, if 10% or more of yeast is added to soybean cake, since the fermentation processing time can be shortened extremely, it is desirable. Furthermore, when using bacterias, such as Bacillus natto and lactic acid bacteria, fermentation processing is performed on the flood part conditions of 40% or more of moisture contents.

[0008] By using the zymosis of the above microorganisms and breeding those microorganisms to soybean cake, the oligosaccharide which is a fish growth inhibition factor in soybean cake decomposes, and is removed, and the feed for farmed fishes by which the digestion nature of soybean cake was improved is obtained.

[0009] Moreover, 10% or more of the useful dry-yeast fungus was blended with soybean cake, it was dried or frozen, and the feed for farmed fishes was obtained. the time of this feed for farmed fishes scouring water to it on the occasion of a feed,

since yeast fungi were blended 10% or more -- under the adjustment -- or the oligosaccharide which yeast fungi propagated promptly by the time a medicine was prescribed for the patient all over seawater after that out of adjustment and it was absorbed in the stomach of a fish, and was contained by zymosis in soybean cake will decompose, and will be removed [0010]

[Example] Hereafter, while the concrete process and experimental result of the feed for farmed fishes are shown, the example of this invention is explained.

[0011] First, an aspergillus is inoculated and cultivated to soybean cake and how to remove oligosaccharide out of soybean cake is explained. Moisture is applied to soybean cake, it adjusts to 35% or less of moisture content, the aspergillus of about 1/1,000 amounts is inoculated to soybean cake, and it is made to breed an aspergillus to soybean cake by this method for two to three days. Thereby, as shown in Table 1, decomposition removal of the oligosaccharide in soybean cake can be carried out.

[0012]

[Table 1]

	ブドウ糖	果糖	蔗糖	ラフィ ノース	スタキ オース	合 計
無処理大豆粕	0 %	0 %	7.87 %	1.33 %	3.67 %	12.87 %
アルコール洗浄 大豆粕A	0	0	0.98	0.70	0	1.68
アルコール洗浄 大豆粕B	0	0	0	0	1.68	1.68
麹菌処理 大豆粕	0	0.26	0	0	0	0.26
焼酎処理 大豆粕	0.30	1.15	0	0	0.72	2.17
酵母処理大豆粕 (水分30%)	0.58	0.25	0	0.23	1.98	3.04
酵母処理大豆粕 (水分40%)	0	0	0	0	0.20	0.20
麹、酵母処理 大豆粕	0	0	0.58	0	0	0.58
納豆菌処理 大豆粕	0	0	0	0	0.20	0.20

[0013] The result shown in Table 1 is a thing when inoculating the seed malt of 1/1,000 amount into the soybean cake of the half-dryness of about 30% of moisture contents, and cultivating at the temperature of 30 degrees C for 48 hours. Even if it compares that to which the content of oligosaccharide was sharply reduced compared with non-processed soybean cake, and carried out fermentation processing also of any of the soybean cake which carried out fermentation processing by the soybean cake and white-distilled-liquor koji which carried out fermentation processing by dried bonito koji especially by dried bonito koji from Table 1 with the soybean cake which performed washing processing by alcohol, the content of oligosaccharide is decreasing.

[0014] Moreover, 2kg soybean cake was adjusted to about 30% of moisture content, the kind of aspergillus was changed, 2g of various koji was inoculated, respectively, koji making was carried out at the temperature of 30-35 degrees C for 48 hours, and the enzyme potency (U/g/hr) of each **** was measured. Here, an enzyme potency (enzyme activity) serves as an index which knows the propagation state of an aspergillus, and enzyme potency 1U says what gives the product of a tyrosin 1microg considerable amount in 60 minutes. Therefore, it means that proliferation of an aspergillus was performed briskly, so that the numeric value of this enzyme potency is large. This measurement result is shown in Table 2.

[0015]

[Table 2]

	中性プロテアーゼ (U/g)	酸性プロテアーゼ (U/g)
無処理大豆粕	0	0
麹菌処理大豆粕	10, 564	7, 826
醤油麹処理大豆粕	7, 583	7, 705
焼酎麹処理大豆粕	2, 679	10, 187
豆味噌麹処理大豆粕	5, 417	6, 683
清酒麹処理大豆粕	5, 210	3, 738

[0016] Although the dried bonito aspergillus bred best the condition [result / which was shown in Table 2] for a low water flow / being called about 30% of moisture contents /, the propagation state with other comparatively good aspergilli was shown.

[0017] furthermore, various moisture contents of 2kg soybean cake were boiled and changed, it was alike, respectively, 2g of seed malt for dried bonitos was inoculated, koji making was carried out at the temperature of 30-35 degrees C for 72 hours, and each number of various germs was measured by the anti-BAI culture medium of DAIGO The result is shown in Table 3.

[0018]

[Table 3]

水分含有量 (%)	2 0	2 5	3 0	3 5	4 0	4 5
中性プロテアーゼ (U/g)	2,679	5,417	11,194	5,819	5,673	4,377
酸性プロテアーゼ (U/g)	2,253	4,675	7,164	4,164	2,278	635
雑菌数 (cells/g)	5.1×10^4	9.1×10^4	8.7×10^4	2.4×10^5	2.9×10^8	9.5×10^9

[0019] Although it is desirable that they are 105 or less cells/g as for the number of various germs at the time of a fermentation end, in order to hold down the number of various germs to 105 cells/g bases and to fully breed an aspergillus moreover from the result shown in Table 3, it is necessary to perform koji making of soybean cake by 35% or less of moisture content 25% or more. Moreover, can prevent various-germs contamination of soybean cake by cultivating an aspergillus by part for a low water flow, and also It comes out enough only by not performing sterilization processing of soybean cake in advance of cultivation, and putting soybean cake at the time of koji making, and ventilating gently to it. from a certain thing A process can be simplified, and further, since **** at the time of a fermentation end will be in the dryness of 15 - 6% of moisture contents, the cost which dryness takes can be reduced.

[0020] Next, also by inoculating and breeding a yeast fungus to soybean cake, decomposition removal of the oligosaccharide can be carried out out of soybean cake, and the digestion nature of soybean cake can be raised. In this case, moisture is applied to soybean cake, it adjusts to 35 - 50% of moisture content, and the yeast fungus of about 1/1,000 amounts or the amount beyond it is inoculated to soybean cake. And when soybean cake inoculates about 1/1,000 amounts of yeast fungi, it will cultivate on two to the 3rd, and when the amount of inoculation of a yeast fungus is increased, according to it, fermentation time becomes short.

[0021] The result shown in Table 1 is a thing when inoculating the dry yeast (for pans) of 1/1,000 amount into soybean cake of about 30% of moisture contents, and about 40% of soybean cake, respectively, and cultivating at the temperature of 30 degrees C for 48 hours. Consequently, in what carried out fermentation processing of the soybean cake adjusted to about 30% of moisture content, although the yeast fungus did not carry out ***** proliferation, sugar is consumed and the content of oligosaccharide is decreasing to 3.04% compared with non-processed soybean cake. However, it cannot be said that oligosaccharide is decreasing even to not necessarily sufficient grade in this case. On the other hand, oligosaccharide is carrying out ***** disappearance of what carried out fermentation processing of the soybean cake adjusted to about 40% of moisture content. Therefore, what is necessary is to adjust soybean cake to 35% or more of moisture content, and considering propagation of a yeast fungus and efficient removal of oligosaccharide, just to carry out fermentation processing. On the other hand, as soybean cake becomes a part for a flood, and shown in Table 4, the degree of contamination of various germs becomes high.

[0022]

[Table 4]

水分含有量 (%)	2 5	3 0	3 5	4 0	4 5	5 0
酵母数 (cells/g)	1.0×10^7	7.7×10^6	1.0×10^8	1.4×10^8	2.4×10^8	2.8×10^8
雑菌数 (cells/g)	5.6×10^3	4.6×10^3	7.2×10^4	1.9×10^5	2.6×10^7	6.4×10^7

[0023] the result shown in Table 4 measures each number of various germs by the anti-BAI culture medium of DAIGO while inoculating 2g of dry yeast into each soybean cake which boiled, changed and carried out moisture adjustment of various moisture contents of 2kg soybean cake, cultivating at the temperature of 30-35 degrees C for 48 hours and measuring each number of yeast by the malt-agar culture medium Although it turns out that it is required for soybean cake for 35% or more of moisture to contain in order for a yeast fungus to fully breed to soybean cake, if it becomes a part for another side and a flood, propagation of various germs will increase more than this result.

[0024] In order to prevent propagation of various germs, if it can do, it is desirable a short time and to finish cultivation within [in 4 hours], and, for that, inoculation of the yeast fungus of 0.2% or more of amount is needed to soybean cake. Although the yeast for a yeast fungus or pans cultivated specially is sufficient as a yeast fungus for inoculation here, considering cost, it is good to use ***** which carries out a byproduction, and wine lees at the time of a brewing of beer, wine, or sake. Those yeast is mixed 0.2% or more to soybean cake, it adjusts so that moisture may be applied to the soybean cake and it may become 35% or more of moisture contents, it is maintained at the temperature of 25-40 degrees C, and while being able to carry out decomposition removal of the oligosaccharide in soybean cake nearly completely by [which do not exceed 4 hours] carrying out time neglect, contamination of various germs can also be suppressed, the yeast fungus of an amount it, the water of the amount of said, and various to the mixture of an soybean (30%) and a fish meal (70%) in Table 5 -- in addition, after various carries out time cultivation at the temperature of 25 degrees C, the result which measured the content of a sucrose, grape sugar, and fruit sugar by the liquid chromatograph is shown

[0025]

[Table 5]

		0 h r	0. 5	1. 0	2. 0	4. 0
大豆・魚粉 +0.2%酵母菌	蔗糖	2.36%	0 %	0 %	0 %	0 %
	ブドウ糖	0	0.88	1.07	1.04	0
	果糖	0	1.29	1.52	1.52	0
大豆・魚粉 +1 %酵母菌	蔗糖	2.36	0	0	0	0
	ブドウ糖	0	1.11	1.01	0	0
	果糖	0	1.95	1.76	0	0
大豆・魚粉 +2 %酵母菌	蔗糖	2.36	0	0	0	0
	ブドウ糖	0	0.91	0	0	0
	果糖	0	1.71	1.43	0	0
大豆・魚粉 +5 %酵母菌	蔗糖	2.36	0	0	0	
	ブドウ糖	0	0.81	0	0	
	果糖	0	1.85	1.38	0	
大豆・魚粉 +10%酵母菌	蔗糖	2.36	0	0	0	
	ブドウ糖	0	0	0	0	
	果糖	0	0	0	0	
大豆・魚粉 +20%酵母菌	蔗糖	2.36	0	0	0	
	ブドウ糖	0	0	0	0	
	果糖	0	0	0	0	

[0026] The result shown in Table 5 shows that oligosaccharide disappears within 4 hours, if 0.2% of yeast fungus is added to the mixture of an soybean and a fish meal. Moreover, when a yeast fungus is added 10% or more to an soybean and a fish meal, it turns out that oligosaccharide disappears within 30 minutes. Therefore, cultivation time can be shortened within 30 minutes by making [many] the addition of a yeast fungus with 10% or more.

[0027] In addition, if there are few various germs of soybean cake (105 or less cells/g), after there being no need of carrying out sterilization processing of the soybean cake in advance of cultivation, and using a box-like simple thing as a culture apparatus and mixing the soybean cake and the yeast fungus which carried out moisture adjustment, no special mechanisms for ventilation etc. are needed that what is necessary is just to leave it at the temperature of 25-35 degrees C. Moreover, soybean cake after carrying out decomposition removal of the oligosaccharide dries or freezes it, and is prepared in the state which can be saved. In addition, as shown in Table 1, even if it uses it combining an aspergillus and a yeast fungus, oligosaccharide is removable out of soybean cake.

[0028] it described above -- as -- a yeast fungus -- soybean cake -- extensive -- for example, if it adds 10% or more and cultivates, cultivation will be completed within 30 minutes The feed for farmed fishes can be prepared using this. That is, a yeast fungus is blended with soybean cake 10% or more, mixture is dried or frozen immediately, employing a yeast fungus efficiently, without cultivating after the mixture, and it is saved as a feed. In this case, considering the preservation side of a feed, as for the yeast to blend, it is desirable that it is dry yeast. and the time of this feed scouring water to it on the occasion of a feed -- under the adjustment -- or the yeast which carried out [yeast] condensation and carried out re-activation by the time a medicine was prescribed for the patient all over seawater after that out of adjustment and it was absorbed in the stomach of a fish vanishes the oligosaccharide in a feed to the inside of a short time (less than 30 minutes) extremely, and digestion nature makes it change to a good feed

[0029] Furthermore, decomposition removal of the oligosaccharide can be carried out out of soybean cake also by inoculating Bacillus natto, lactic acid bacteria, etc. into soybean cake, and cultivating on the flood part conditions of 40% or more of moisture contents. The result shown in Table 1 is a thing when inoculating the Bacillus natto culture medium of 1/1,000 amount into soybean cake of about 50% of moisture contents, and cultivating at the temperature of 30 degrees C for 24 hours. Also in this case, the oligosaccharide in soybean cake carried out ***** disappearance by cultivation of 24 hours. In addition, since a bacteria, especially Bacillus natto grow in soybean cake well, although the cultivation is easy, since the soybean cake after a fermentation end is in a flood part state, a stoving process or a cryopreservation process is required for it.

[0030] In addition, although isoflavone glycosides which are detrimental and an unpleasant taste component, such as a daizin and a genistin, are contained so much besides oligosaccharide in soybean cake, since decomposition removal is carried out out of soybean cake simultaneous [those isoflavone glycosides] in case decomposition removal of the oligosaccharide in soybean cake is carried out by the zymosis of microorganisms, such as an aspergillus, a yeast fungus, and Bacillus natto, the feed for farmed fishes which was excellent considering soybean cake as a raw material will be obtained.

[0031] Drawing 1 is a graph which shows the result of the comparative experiments of the protein slaking property of soybean cake and a fish meal. The experiment was conducted by measuring the protein of supernatant Naka by the Kjeldahl method, after adding the pure water of an amount, and 0.5% (3,000 U/g/hr) of pepsin to soybean cake (no processing and dried bonito koji processing), alcoholic washing soybean cake, and the dryness fish meal 10 times, respectively and carrying out predetermined-time churning at pH 3 and 25 degrees C. Although the fish meal contained many quality of a water soluble protein from the first, the result shown in drawing 1 shows that the dried bonito koji processing soybean cake which each slaking property of dried bonito koji processing soybean cake and non-processed soybean cake comes to exceed other two persons' slaking property, and finally applies to this invention is most excellent in the slaking property by the pepsin,

when 30 minutes - 1 hour after a decomposition-reaction start is passed.

[0032] Soybean cake excels the dryness fish meal in the slaking property so that the result shown in drawing 1 may also show. Therefore, if oligosaccharide is removed out of soybean cake, soybean cake may serve as a feed which was superior to the dryness fish meal for farmed fishes, such as a yellowtail. Drawing 2 is a graph which shows the result of the breeding test of a yellowtail. The experiment held the yellowtail of 20.2g of average weight in every the 1t 50 fish tank made from circular FRP, respectively, and was conducted by giving three kinds of feeds of an oligosaccharide content as shown in Table 6 at the fixed rate of a feed twice on the 1st, respectively, and breeding them for 30 days.

[0033]

[Table 6]

	ブドウ糖	果糖	蔗糖	ラフィ ノース	スタキ オース	合 計
本発明に係る 餌料	0 %	0 %	0.92%	0 %	0 %	0.92%
乾燥魚粉 餌料 A	0	0	2.36	0.40	1.10	3.86
乾燥魚粉 餌料 B	6.84	0	2.38	0.50	0.92	10.64

[0034] The increase in the average weight of a yellowtail has the largest feed using the dried bonito koji processing soybean cake concerning this invention with few contents of oligosaccharide so that drawing 2 may show. Moreover, the average weight and feed efficiency of a yellowtail in this breeding test are shown in Table 7.

[0035]

[Table 7]

	本発明に係る 餌料	乾燥魚粉 餌料 A	乾燥魚粉 餌料 B
平均体重 0day	20.2 g	20.2 g	20.2 g
平均体重 30day	87.3 g	74.8 g	65.9 g
餌料効率	94.8 %	68.4 %	58.3 %

[0036] The feed concerning this invention is most superior to the result shown in Table 7 also in feed efficiency, and it can be said that it is very useful as a feed for farmed fishes.

[0037]

[Effect of the Invention] Since it is constituted and this invention acts as explained above, according to the manufacture method concerning this invention The feed for farmed fishes which can obtain the feed for farmed fishes which does not contain the oligosaccharide which is growth inhibitor by using soybean cake as a raw material, and starts this invention Even if it is using soybean cake as the raw material, the cheap feed for farmed fishes which is replaced with the sardine which growth of a fish was not checked and is used by this invention until now, or its fish meal and which can be supplied adequately can be secured, and this invention can greatly contribute to expansion development of future aquaculture.

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Translated text in English

A total feeding according to the invention is possible
for example the
next composition has.

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bijvoorbeeld de volgende samenstelling hebben.

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